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09/719,948	12/19/2000	Shigeru Okita	313MC/49472	5315

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EXAMINER

NGUYEN, XUAN LAN T

ART UNIT PAPER NUMBER

3683

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application N .

09/719,948

Applicant(s)

OKITA ET AL.

Examiner

Lan Nguyen

Art Unit

3683

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 24 March 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1.5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: *Translation of JP 6-54921*.

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## DETAILED ACTION

### *Drawings*

1. The corrected or substitute drawings were received on 3/24/03. These drawings are approved.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 5, 8, 9, 10 and 12-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re: claim 5, "and the rolling surface roughness of the rolling element," first occurrence on lines 11-12 (including the stricken lines in the amended claim 5), needs to be deleted.

Re: claim 8, line 2, "outer", second occurrence, needs to be --inner--.

Re: claim 8, lines 13 and 15, "for the diameter" needs to be --of the diameter--.

Re: claim 9, line 10, "and/or" renders claim 9 indefinite.

Re: claim 10, line 2, "outer", second occurrence, needs to be --inner--.

Re: claim 10, line 6, --one of-- needs to be inserted between "under" and "lubrication".

Re: claim 10, lines 13 and 15, "for the diameter" needs to be --of the diameter--.

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Re: claims 12, 13 and 14, lines 3-4, "and the surface roughness of the rolling element," needs to be deleted.

Re: claims 13 and 14, claims 13 and 14 are conflicting with claims 4 and 11 which they depend from, respectively. Claims 4 and 11 claim that the rolling elements are formed of steel while claims 13 and 14 claim the material to be ceramics. For the purpose of examining, claims 13 and 14 are being examined as "wherein at least the rolling element has a dense nitride layer on the surface of the rolling element, and the surface roughness of the rolling element is 0.005  $\mu\text{m}$  Ra or less and the surface hardness is Hv 900 or more."

***Claim Rejections - 35 USC § 103***

4. Claims 1, 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin.

Re: claim 1, Wallin shows a rolling bearing, as in the present invention, comprising: an outer ring, an inner ring, rolling elements as shown in figure 2, with a contact angle of 30 degrees in the abstract. Wallin is silent of the bearing lubrication. It is old and well known in the art of bearings to provide lubrication with lubricating oil. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Wallin's bearing with a lubricating oil to improve the smoothness of the bearing.

Re: claim 2, Wallin shows in the abstract, the contact angle is 30 degrees.

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Re: claim 7, the claimed feature is considered a design feature where the hardness of the rolling bodies and the hardness of the raceways can be designed to accommodate different applications.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Tanaka et al. (USP 5,998,042).

Wallin's bearing, as discussed in the rejection of claim 1, is silent of the material make up of the rolling elements. Tanaka et al. teach the use of rolling elements wherein the elements are made of steel with at least 10% by weight of Cr in the abstract. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used rolling elements with the content of steel with at least 10% by weight of Cr as taught by Tanaka in order to provide strength and wear resistance to the rolling elements.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Niizeki (JP 09229072 A).

Wallin's bearing, as discussed in the above rejection of claim 1, lacks the absent of obstacles with a mean diameter of 3  $\mu$ m or more. Niizeki teaches the concept of having a raceway surface without obstacles of mean diameter of 3 or more in the abstract to improve the performance of the bearing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have construct Wallin's bearing with raceway surface without obstacles of mean diameter of 3 or more to improve the performance of the bearing as taught by Niizeki.

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7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Tanaka et al. (USP 5,998,042) and further in view of Niizeki et al. (JP 10103356 A).

Wallin's bearing, as discussed in the above rejections of claims 1 and 4, lacks the material and roughness of the rolling elements. Niizeki et al. teach the concept of using ceramics as a material and to set the roughness of the rolling elements to 0.005  $\mu\text{m}$  Ra to improve the performance of the bearing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed Wallin's bearing with ceramics which comprise a roughness of 0.005  $\mu\text{m}$  Ra to improve the performance of the bearing as taught by Niizeki et al.

8. Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Takemura et al. (USP 5,411,336).

Wallin shows a rolling bearing, as in the present invention, comprising: an outer ring, an inner ring, rolling elements as shown in figure 2, with a contact angle of 30 degrees in the abstract. Wallin is silent of the bearing lubrication and a roughness ratio between the races and the rolling elements to be 6 or less. Takemura et al. teach the concept of having the roughness ratio of the races to the rolling elements to be 3 or less in a lubricated bearing assembly to prevent peeling damage. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed Wallin's bearing with a roughness ratio between the races and the rolling elements of 3 or less and to have further provided a lubrication oil as taught by Takemura et al. in order to prevent peeling damage.

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9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Takemura et al. (USP 5,411,336) and further in view of Tanaka et al. (USP 5,998,042).

Wallin's bearing, as discussed in the rejection of claim 3, is silent of the material make up of the rolling elements. Tanaka et al. teach the use of rolling elements wherein the elements are made of steel with at least 10% by weight of Cr in the abstract. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used rolling elements with the content of steel with at least 10% by weight of Cr as taught by Tanaka in order to provide strength and wear resistance to the rolling elements.

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Takemura et al. (USP 5,411,336) and further in view of Niizeki et al. (JP 10103356 A).

Wallin's bearing, as discussed in the above rejection of claim 3, lacks the material and roughness of the rolling elements. Niizeki et al. teach the concept of using ceramics as a material and to set the roughness of the rolling elements to 0.005  $\mu\text{m}$  Ra to improve the performance of the bearing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed Wallin's bearing with ceramics which comprise a roughness of 0.005  $\mu\text{m}$  Ra to improve the performance of the bearing as taught by Niizeki et al.

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11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in views of Takemura et al. (USP 5,411,336) and Tanaka et al. (USP 5,998,042) and further in view of Tsushima et al. (JP 11080923 A).

Wallin's bearing, as discussed in the above rejection of claim 11, lacks the layer of nitride and the hardness for the rolling elements. Tsushima et al. teach in the abstract the treatment of nitride on steel rolling elements in order to achieve a surface hardness of 1000 Hv. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further provided Wallin's bearing with a treatment of nitride to achieve a level of hardness to be 1000 Hv in order to increase the life and the performance of the bearing assembly as taught by Tsushima et al.

12. Claims 5 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin (USP 5,273,413) in view of Tsushima et al. (JP 11080923 A).

Re: claims 5 and 15, Wallin shows a rolling bearing, as in the present invention, comprising: an outer ring, an inner ring, rolling elements as shown in figure 2, with a contact angle of 30 degrees in the abstract. Wallin is silent of the lubrication, the nitride layer and the level of hardness. It is old and well known in the art of bearings to provide lubricating oil. Tsushima et al. teach in the abstract the treatment of nitride on rolling elements in order to achieve a surface hardness of 1000 Hv. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Wallin's bearing with a treatment of nitride to achieve a level of hardness to be 1000 Hv in order to increase the life and the performance of the bearing assembly as taught by Tsushima et al.



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13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otsutake (JP 6-54921).

Otsutake shows a cage, as in the present invention, wherein said cage is formed with an advanced resin material into a circular shape with a plurality of pockets, as shown in figure 1. Otsutake show a weld line 1b wherein the size of the opening D1 is larger than the opening of D. The claimed percentages are considered design choices and would have been obvious for one of ordinary skill in the art at the time of the invention to have tried different sizes in order achieve a difference performances of the bearing assembly. Note that a conventional bearing would have an inner race, an outer race, rolling elements and lubricating oil.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niizeki (JP 09229072 A) in view of Yasui et al. (JP 06165790 A) and further in view of Masuda et al. (USP 5,199,799).

Niizeki show a rolling bearing with an outer race 2, an inner race 3, rolling elements 4, a cage 5 wherein said cage is made of PTFE in the abstract. Niizeki lacks the chamfering on both sides of the cage and having a hole on the bottom. Yasui et al. teach the concept of chamfering the sides of the cage. Masuda et al. teach the concept of having a hole on the bottom of the cage. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Niizeki's bearing with a chamfered cage having holes on the bottom of the cage in order for lubrication to be evenly distributed within the cage as taught by Yasui and Masuda.

***Allowable Subject Matter***

15. Claim 10 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

***Response to Arguments***

16. Applicant's arguments filed on 3/24/03 have been considered but are moot in view of the new ground(s) of rejection.

17. Note that document JP-6-54921 is now being considered due to the availability of a translation of the document. A copy of the IDS with Examiner's initial is enclosed for Applicant's record. A copy of the translation is also enclosed.

***Conclusion***

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Nguyen whose telephone number is 703-308-8347. The examiner can normally be reached on M-F, 9 to 5:30.

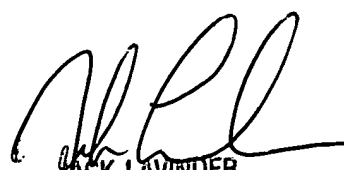
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Lavinder can be reached on 703-308-3421. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-4177.

XLN

XLN  
June 12, 2003

  
JACK LAVINDER  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600  
6/13/03

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APPLICANT'S COPY

**MACHINE-ASSISTED TRANSLATION (MAT):**

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(54)【考案の名称】 転がり軸受用保持器	(54)[NAME OF DESIGN] The retainer for rolling bearings
(51)【国際特許分類第 5 版】 F16C 33/38                      9031-3J	(51)[IPC] F16C 33/38                      9031-3J
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Noda, Masashi (et al.)

## (57) 【要約】

## (57)[SUMMARY]

## 【目的】

樹脂製の保持器において、ゲート部やウェルド部近傍のポケット隙間が確保できて、円滑な回転が行えるようにする。

## [OBJECT]

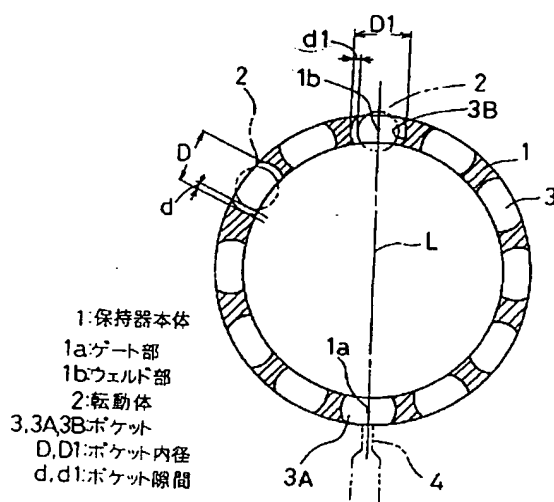
In a resin retainer, the cage pocket clearance near the gate part and the weld part can be ensured, and smooth rotation can be performed.

## 【構成】

## [SUMMARY OF THE INVENTION]

保持器本体 1 のゲート部 1 a の近傍、およびウェルド部 1 b の近傍におけるポケット 3 A、3 B のポケット隙間  $d_1$  を、他のポケット 3 のポケット隙間  $d$  よりも大きくする。これにより、ゲート部 1 a やウェルド部 1 b 付近で生じ易い成形収縮に対して、必要な転動体 2 の可動範囲が確保できる。

The cage pocket clearance  $d_1$  of pocket 3A and 3B near the gate part 1a of the main body 1 of a retainer, and near the weld part 1b, is made larger than cage-pocket-clearance  $d$  of the other pocket 3, thereby, the movable range of the required rolling element 2 can be ensured to the molding shrinkage which is easy to produce gate part 1a and near weld part 1b.



- 1: Main body of retainer  
 1a: gate part  
 1b: weld part  
 2: rolling element  
 3, 3A, 3B: pocket  
 D, D1: pocket internal diameter  
 d, d1: cage pocket clearance

【実用新案登録請求の範囲】

[Utility-model registration Claim]

【請求項 1】

転がり軸受の転動体を各々收容する多数のポケットを有する樹脂性保持器であって、ゲート部

[CLAIM 1]

A retainer for rolling bearings, which is the resin retainer which has multiple pocket to accommodate each of the rolling element of a

近傍およびウェルド部近傍におけるポケットの内面と転動体との間のポケット隙間を、他のポケットのポケット隙間よりも大きくしたことを特徴とする転がり軸受用保持器。

rolling bearing, comprised such that the cage pocket clearance between the interiors of a pocket and rolling elements, near the gate part and near the weld part, was made larger than the cage pocket clearance of the other pocket.

**【図面の簡単な説明】**

**[BRIEF EXPLANATION OF DRAWINGS]**

**【図 1】**

この発明の一実施例を示す断面図である。

**[FIGURE 1]**

It is the sectional view showing one example of this invention.

**【図 2】**

その切欠斜視図である。

**[FIGURE 2]**

It is that notch perspective diagram.

**【図 3】**

その保持器の部分拡大側面図である。

**[FIGURE 3]**

It is the partially enlarged side view of that retainer.

**【図 4】**

他の実施例における保持器の部分側面図である。

**[FIGURE 4]**

It is the part side view of the retainer in the other example.

**【図 5】**

さらに他の実施例における保持器の斜視図である。

**[FIGURE 5]**

Furthermore it is the perspective diagram of the retainer in the other example.

**【図 6】**

従来例の断面図である。

**[FIGURE 6]**

It is the sectional view of a prior art example.

**【図 7】**

その保持器を組み込んだ軸受の部分断面図である。

**[FIGURE 7]**

It is the fragmentary sectional view of the bearing incorporating that retainer.

**【符号の説明】**

1…保持器本体、1 a…ゲート部、1 b…ウェルド部、2…転動体、3, 3 A, 3 B…ポケット、D, D 1…ポケット内径、d, d 1…ポケット隙間

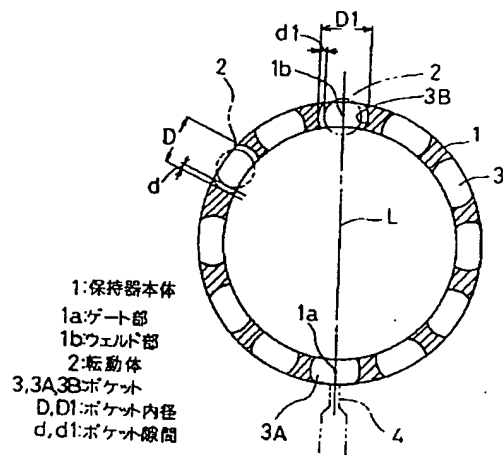
**[EXPLANATION OF DRAWING]**

1. Main body of retainer, 1a... gate part, 1b... weld part, 2... rolling element, 3, 3A, 3B... pocket, D and D1... pocket internal diameter, d and d1... cage pocket clearance



【図 1】

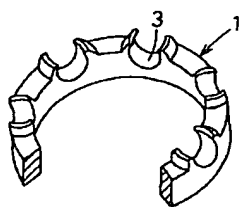
[FIGURE 1]



- 1: Main body of retainer  
1a: gate part  
1b: weld part  
2: rolling element  
3, 3A, 3B: pocket  
D, D1: pocket internal diameter  
d, d1: cage pocket clearance

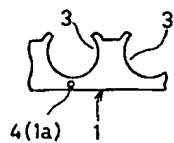
【図 2】

[FIGURE 2]



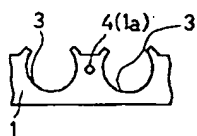
【図 3】

[FIGURE 3]



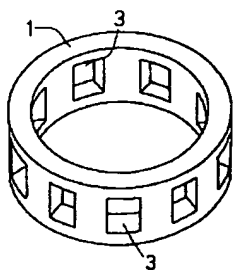
【図 4】

[FIGURE 4]



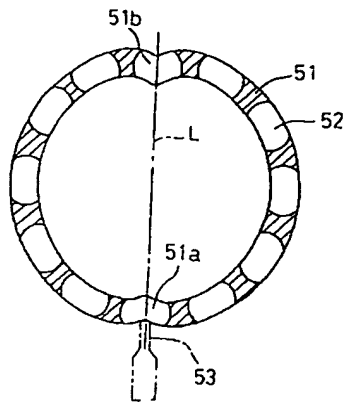
【図 5】

[FIGURE 5]



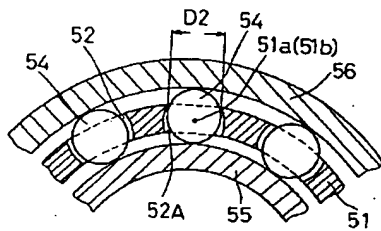
【図 6】

[FIGURE 6]



【図 7】

**[FIGURE 7]**



### 【考案の詳細な説明】

**[Detailed explanation of a design]**

【 0 0 0 1 】

**[0001]**

【産業上の利用分野】

この考案は、射出成形で作られる樹脂製の転がり軸受用保持器に関する。

**[INDUSTRIAL APPLICATION]**

This design is related with the resin retainer for rolling bearings made from an injection molding.

【 0 0 0 2 】

**[0002]**

### 【従来の技術】

転がり軸受における保持器は、

[PRIOR ART]

The retainer in a rolling bearing should provide

図6に示すようにリング状の保持器本体51に  
 転動体を各々収容する多数ポケット52を設けたものとされる。このような保持器を射出成形で成形する場合、成形用金型のキャビティー内に樹脂材料を注入するゲート53を同図のように保持器本体51の一部に臨ませて成形を行う。ゲート53から注入された樹脂材料は、金型内に設けられた環状のキャビティー内を左右に別れて反対側に流れ、ゲート53を通る直径線L上において合流し接合する。この接合部分がウェルド部51bと呼ばれる。

【0003】

【考案が解決しようとする課題】

前記のように射出成形した保持器は、ゲート53の配置されたゲート部51aやウェルド部51bが、その他の部位に比べて成形収縮率が大きいいため、成形後にその部分の寸法が小さくなって真円度が崩れる。例えば、図6に示す1点ゲートの保持器では、同図に強調して示すように、ゲート部51aやウェルド部51bが内径側へ突出した形状となる傾向がある。

保持器の真円度がこのように崩れると、図7に示すようにポケット52に転動

the rolling element each multiple pocket 52 to accommodate to the main body 51 of a retainer of a ring shape, as shown in Fig. 6.

When forming such a retainer by the injection molding, it forms by making a part of main body 51 of a retainer overlook the gate 53 which injects resin material, in the cavity of the die for a molding, as shown in said diagram.

The resin material injected from the gate 53 separates right and left, and flows a reverse side in the inside of the cyclic cavity provided in the die. It flows and joins on direct meridian L passing through a gate 53.

This junctional part is called weld part 51b.

[0003]

**[The problem which a design tends to solve]**

Injection molded retainer as mentioned above, in which Gate part 51a and weld part 51b by which the gate 53 has been placed have a large molding shrinkage compared with that other part. Therefore, the size of that part becomes small to this after a molding, and roundness collapses.

For example, in the retainer of the 1 point gate shown in Fig. 6, as emphasized and shown in said diagram, there is a tendency that gate part 51a and weld part 51b are a projected shape to an internal-diameter side.

If the roundness of a retainer collapses in this way, in the condition of having accommodated the rolling element 54 in the pocket 52, and having incorporated between the inner ring 55 and the outer wheel 56 as shown in a Figure 7, at the pocket 52A of gate part 51a or weld part 51b, pocket width D2 part in the outer-diameter surface of the main body 51 of a retainer approximates an internal-diameter side

体 5 4 を收容して内輪 5 5 と外輪 5 6 間に組み込んだ状態において、ゲート部 5

1 a やウェルド部 5 1 b のポケット 5 2 A では、保持器本体 5 1 の外径面におけ

るポケット幅 D 2 部が内径側に近づくため（転動体 5 4 の中心よりに近づくため

）、転動体 5 2 と外径面におけるポケット内周との間のポケット隙間が殆ど無く

なることがある。このため、軸受の円滑な回転に支障を来す恐れがある。

(The centre of a rolling element 54 is approximated). The cage pocket clearance between a rolling element 52 and the pocket internal circumference in an outer-diameter surface may almost be eliminated.

For this reason, a possibility that trouble may be caused is in smooth rotation of a bearing.

#### 【 0 0 0 4 】

この発明の目的は、全体のポケットのポケット隙間が確保できて、円滑な回転が行える転がり軸受用保持器を提供することである。

#### [0004]

The objective of this invention is to provide the retainer for rolling bearings which can ensure the cage pocket clearance of an entire pocket and can perform smooth rotation.

#### 【 0 0 0 5 】

【課題を解決するための手段】  
この発明の転がり軸受用保持器は、転がり軸受の転動体を各々收容する多数のポケットを有する樹脂性保持器であって、ゲート部近傍およびウェルド部近傍におけるポケットの内面と転動体との間のポケット隙間を、他のポケットのポケット隙間よりも大きくしたものである。

#### [0005]

#### [SOLUTION OF THE INVENTION]

The retainer for rolling bearings of this invention is a resin retainer which has the rolling element of a rolling bearing each pocket of many to accommodate, comprised such that the cage pocket clearance between the interior of a pocket, and a rolling element near the gate part, and near the weld part, was made larger than the cage pocket clearance of the other pocket.

#### 【 0 0 0 6 】

#### [0006]

**【作用】**

保持器の成形収縮は、ゲート部近傍およびウェルド部近傍において他の部位よりも大きく生じる。しかし、前記のようにゲート部近傍およびウェルド部近傍のポケットのポケット隙間を、予め他のポケット隙間よりも大きく設定してあるため、成形収縮により保持器の真円度が崩れても、必要な寸法のポケット隙間が確保される。すなわち、ゲート部近傍およびウェルド部近傍のポケット隙間を、成形収縮の影響分だけ予め大きくしておくことにより、必要な寸法のポケット隙間が確保される。

**【0007】****【実施例】**

この発明の一実施例を図1ないし図3に基づいて説明する。この実施例は、玉軸受の保持器に適用した例であり、リング状の樹脂製の保持器本体1に球形の転動体2を各々収容する多数のポケット3が設けてある。各ポケット3は、内面が転動体2よりも若干大径の球面状に形成され、また各ポケット3は図2のように軸方向の片面に開口し、保持器本体1の側面形状が櫛状となっている。

**【0008】****【EFFECT】**

The molding shrinkage of a retainer is produced more largely near the gate part and near weld part than in the other part.

However, the cage pocket clearance of the pocket near the gate part and near the weld part is set up beforehand as mentioned above more largely than the other cage pocket clearance.

Even when it accumulates and the roundness of a retainer collapses according to a molding shrinkage, the cage pocket clearance of a required size is ensured.

That is, the cage pocket clearance near the gate part and near the weld part is enlarged beforehand an influenced part of a molding shrinkage.

The cage pocket clearance of a required size is ensured.

**[0007]****【Example】**

One example of this invention is explained based on Fig. 1 or 3.

This example is an example applied to the retainer of a ball bearing.

Each pocket 3 of many to accommodate has provided the globular form rolling element 2 to the resin main body 1 of a retainer of a ring shape.

As for each pocket 3, the interior is formed in the spherical shape of a large diameter a little from a rolling element 2.

Moreover each pocket 3 is opened on single side of an axial direction, as shown in Fig. 2.

The side shape of the main body 1 of a retainer is the pectinate.

**[0008]**

保持器本体 1 は、1 点ゲートによる射出成形品からなり、成形用金型のキャビティ内に樹脂材料を注入するゲート 4 は、図 1 および図 3 のようにポケット本体 1 の外周の一部に臨ませられる。ゲート 4 を通る保持器本体 1 の直径線 L 上におけるゲート 4 と反対側の部分がウェルド部 1 b となる。ポケット 3 の個数は、この実施例は偶数個としてあり、ゲート部 1 a およびウェルド部 1 b に各々ポケット 3 A, 3 B が位置している。

#### 【0009】

これらゲート部 1 a およびウェルド部 1 b のポケット 3 A, 3 B は、ポケット内径寸法 D1 を、他の各ポケット 3 の内径寸法 D よりも若干大きくしてある。各転動体 2 は同じ径のものであり、したがってゲート部 1 a およびウェルド部 1 b のポケット 3 A, 3 B におけるポケット内面と転動体 2 との間の隙間 d1 は、他のポケット 3 のポケット隙間 d よりも大きく形成されている。なお、これらのポケット隙間 d, d1 は、ポケット半径と転動体半径の差である。

#### 【0010】

上記構成の作用を説明する。保持器本体 1 の成形収縮は、ゲート部 1 a の近傍およびウェルド部 1 b の近傍に

The main body 1 of a retainer consists of the injection molded products by the 1 point gate. It is made to face the gate 4 which injects resin material in the cavity of the die for a molding a part of periphery of the pocket main body 1, as shown in Fig. 1 and 3.

The gate 4 on direct meridian L of the main body 1 of a retainer passing through a gate 4 and the part of a reverse side are weld part 1b.

This example is made the number of a pocket 3 into even pieces.

Each pocket 3A and 3B position in gate part 1a and weld part 1b.

#### [0009]

These gate part 1a and pocket 3A of weld part 1b, and 3B have enlarged a little the pocket internal-diameter size D1 from internal-diameter size D of each of other pocket 3.

Each rolling element 2 is the same diameter.

Therefore, gap d1 between the pocket interior and the rolling element 2 pocket 3A and 3B of the gate part 1a and weld part 1b is formed more largely than cage-pocket-clearance d of the other pocket 3.

In addition, these cage pocket clearances d and d1 are the differences of a pocket radius and a rolling-element radius.

#### [0010]

An effect of the above-mentioned component is explained.

The molding shrinkage of the main body 1 of a retainer, near the gate part 1a and near the weld part 1b, is produced more largely than the

において他の部位よりも大きく生じる。しかし、前記のようにゲート部 1 a およびウェルド部 1 b のポケット 3 A, 3 B のポケット隙間  $d_1$  は、予め他のポケット隙間  $d$  よりも大きく設定されているため、成形収縮により保持器本体 1 の真円度が崩れても、保持器外径部においてもポケット 3 A, 3 B と転動体 2 の必要隙間が確保される。

#### 【0011】

すなわち、ポケット 3 A, 3 B の内径寸法  $D_1$  を他の部分の内径寸法  $D$  よりも大きくする程度は、形成収縮にばらつきがあっても、許容範囲の成形収縮であれば、外径部におけるポケット隙間が必要な寸法だけ確保できる程度としておく。

なお、ゲート部 1 a およびウェルド部 1 b のポケット隙間  $d_1$  は、必要以上に大きくなることがあるが、隙間  $d_1$  が大きくなっても、転動体 2 の可動範囲が広がるだけであり、また隙間  $d_1$  を大きくするポケットの数も少ないので、実用上の弊害は生じない。

#### 【0012】

前記実施例は、ゲート部 1 a をポケット 3 に位置させた場合につき説明したが、図 4 に示すように隣合うポケット 3, 3 間にゲート部 1 a を位置させても良い

other part.

However, the cage pocket clearance  $d_1$  of pocket 3A and 3B in gate part 1a and weld part 1b, is set up beforehand as mentioned above more largely than other cage-pocket-clearance  $d$ .

Therefore, even when the roundness of the main body 1 of a retainer collapses according to a molding shrinkage, also in a retainer outer-diameter part, required gap between pocket 3A, and 3B and the rolling element 2 is ensured.

#### [0011]

That is, pocket 3A and the internal-diameter size  $D_1$  of 3B are made larger than internal-diameter size  $D$  of the other part. If an its level is the molding shrinkage of a tolerance even when variation is in a formation shrinkage, it will be taken as the level to which the cage pocket clearance in an outer-diameter part can ensure only a required size.

In addition, the cage pocket clearance  $d_1$  of gate part 1a and weld part 1b may consist large more than necessity.

However, even when gap  $d_1$  consists large, the movable range of a rolling element 2 only extends.

Moreover because the number of the pockets which enlarge gap  $d_1$  is also few, a practical bad effect is not produced.

#### [0012]

The above-mentioned example was explained per, when making a pocket 3 position gate part 1a. However, gate part 1a may be made to position between pocket 3,3 which is been adjacent as shown in a Figure 4.

In this case, a cage pocket clearance is enlarged from the other pocket as an above



。その場合、ゲート部 1 a の両側のポケット 3, 3 につき、前記と同様に他のポケットよりもポケット隙間を大きくする。ウェルド部が 2 個のポケット 3, 3 の中間に位置する場合も、同様にウェルド部の両側 2 個のポケットにつき、ポケット隙間を大きくする。

**【0013】**

また、前記実施例は玉軸受の保持器に適用した場合につき説明したが、この考案は、例えば図 5 に示すようなころ軸受の保持器にも前記と同様に適用することができる。

**【0014】**

**【考案の効果】**

この発明の転がり軸受用保持器は、ゲート部近傍およびウェルド部近傍のポケットのポケット隙間を、成形収縮の影響分を考慮して予め大きく設定するため、成形収縮によっても、必要な寸法のポケット隙間が確保でき、円滑な回転を得ることができる。

mentioning about the double-sided pockets 3 and 3 of gate part 1a.

When a weld part positions in the middle of 2 pockets 3 and 3, per pocket of 2 both sides of a weld part and a cage pocket clearance are enlarged similarly.

**[0013]**

Moreover, the above-mentioned example was explained per, when applying to the retainer of a ball bearing.

However, this design is applicable, for example, it is the same as that of being above-mentioned also to the retainer of the roller bearing shown in Fig. 5.

**[0014]**

**[The effect of a design]**

The retainer for rolling bearings of this invention considers an influenced part of a molding shrinkage, and sets up beforehand the cage pocket clearance of the pocket near the gate part and near the weld part largely. Therefore, the cage pocket clearance of a required size can be ensured also according to a molding shrinkage. Smooth rotation can be obtained.

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	Applicant SHIGERU OKITA ET AL.	
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EXAMINER <i>Lan Nguyen</i>	DATE CONSIDERED 3/21/02

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